REMARKS

In the Non-Final Office Action of April 15, 2004, claims 1-13 are pending. Claims 1, 10-11, and 13 are independent claims from which all other claims depend therefrom. Claims 1, 3-4, and 10-13 have been amended.

The specification is objected to for informality reasons. The Office Action states that in Figures 1 and 3 signals 34 and 62 are "feed back signals" not "feed forward signals". Paragraph [0005] of the specification has been amended such that signal 34 is referred to as an output or desired signal. Applicant agrees as is supported by Figure 1 that the desired signal 34 is used as a feedback signal although it is not referred to as such. The title of the present application, paragraphs [0011]-[0012], [0027]-[0032], [0037]-[0038], [0040], and [0042], and Figure 5 have been amended to correct and replace all usage of the term "feedforward" with "feedback". Page 2 of the figures is submitted herewith containing amended Figure 5.

The Office Action further states that the correlator and the error signal of Figure 1 are improperly labeled. Paragraph [0005] of the specification has been amended such that the correlator is denoted by number 24 and the error signal is denoted by number 26, as is shown in Figure 1.

Claims 1, 3-4, and 10-12 are also objected to for informality reasons. Specifically the "reference feedforward signal" is an error and should be corrected to "reference feedback signal". Claims 1, 3-4, and 10-13 have been amended to replace the term "feedforward" with the term "feedback".

Claim 13 stands rejected under 35 U.S.C. 112 for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Office Action states that claim 13 lacks antecedent basis for the limitation "interference reference" in line 8. Line 8 of claim 13 has been amended such that the terms "said interference reference" are replaced with the terms "an interference reference".

Claims 1-2 and 7-9 stand rejected under 35 U.S.C. 102(e) as being anticipated by the admitted prior art.

The Office Action states that the admitted prior art teaches a method of digitally canceling interference on a received signal within a satellite payload including adaptively canceling interference on the received signal using an interference reference feedforward signal and refers to Figure 1 and paragraph [0003] for such teaching. Applicants, respectfully, traverse. Note that the term "feedforward" has been amended to "feedback".

Applicants submit that the admitted prior art does not teach any of the elements of claim 1, namely, digitally canceling interference, digitally canceling interference on a received signal, performing the stated tasks within a satellite payload, and adaptively canceling interference on the received signal using an interference reference feedback signal.

The admitted prior art, as is shown in Figure 1 and described in paragraph [0005], receives an analog signal and an interference reference signal. An output or desired signal is compared with the interference reference signal to generate an error signal. An interference signal is generated in response to the interference reference signal and the error signal. The desired signal is the only feedback signal shown and described. The desired signal is not an interference reference signal or an interference reference feedback signal. The admitted prior art uses the received signal, from the second source, as the interference reference signal. The admitted prior art does not use the desired signal as the interference reference signal.

Nowhere in Figure 1 or in paragraphs [0003] and [0005] is the digital cancellation of interference mentioned, taught, or suggested. The only instance where the term "digital" is recited is in paragraph [0003]. In paragraph [0003] the term digital is used to state that there are satellite systems that generate digital transmit signals, which is clearly different than the digital cancellation of interference. Furthermore, in paragraph [0003] it is stated that the received signals and the digital transmit signals have narrow bandwidth and that the multiplexing and transmitting thereof amplifies the interference created on the received signals.

Thus, the admitted prior art does not teach or suggest each and every element recited in claim 1, therefore claim 1 is novel, nonobvious, and is in a condition for allowance.

Claims 3-6 and 10-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of Cioffi et al. (USPN 5,995,567). Applicants again, respectfully, traverse.

Claim 10 recites a method of digitally canceling interference on a received signal within a satellite payload. The method includes receiving a communication signal having interference. The communication signal is converted into the received signal. A counter-interference signal is subtracted from the received signal to form a desired signal. The desired signal is digitally processed to form an interference reference feedback signal. The interference reference feedback signal is correlated to the desired signal to generate an error signal. Interference on the received signal is adaptively canceled based on the error signal by generation of the counter-interference signal to cancel the interference.

Cioffi discloses a radio frequency noise canceller for a ground based communication system. The noise canceller includes, as is shown in Figure 6, a pair of analog to digital converters (ADC), a subtractor, and a digital signal processor (DSP). A differential signal v_d is received by a first ADC 604 and a common mode signal or reference noise signal v_c is received by a second ADC 510. A digital noise signal 512 is subtracted from the difference signal to form a noise-cancelled difference signal or desired signal v_{fD}. The DSP generates a digital noise signal 512 in response to the reference noise signal v_c and the desired signal v_{fD}. Note that the reference noise signal, like the interference reference signal of the admitted prior art is not a feedback signal and is not generated from the circuitry or components of the canceller.

The Office Action states that the admitted prior art teaches a correlator correlating an interference reference feedback signal 34 to the desired signal to generate an error signal. Applicants submit, as stated above, that the admitted prior art correlates a non-feedback interference reference signal with a desired signal to generate an error signal. Signal 34 is the desired signal. Signal 34 is not an interference feedback signal.

The Office Action further states that the admitted prior art fails to teach digitally canceling interference in a received signal within a satellite payload by

digitally processing the desired signal to form an interference reference feedback signal. Applicants agree. However, the Office Action states that Cioffi teaches digitally processing a desired signal to form an interference reference feedback signal v_{fD}. Applicants submit that Cioffi does not mention, teach, or suggest an interference reference feedback signal. The Office Action appears to incorrectly denote and refers to the desired signal v_{fD} of Cioffi as an interference reference feedback signal. Cioffi forms the noise signal 512 from the reference noise signal v_c and the desired signal v_{fD}. Nowhere in Cioffi is an interference reference feedback signal utilized.

Also, note that the reference noise signal 512 is similar to the admitted prior art interference reference signal in that they are both received from a separate source and are not generated or formed via feedback circuitry, as is the interference reference feedback signal of claim 10.

Thus, the admitted prior art and Cioffi references, alone or in combination, fail to teach or suggest digitally processing a desired signal to form an interference reference feedback signal and therefore fail to teach or suggest each and every element as required of claim 10. As a result, Applicants submit that claim 10 is also novel, nonobvious, and is in a condition for allowance.

Claim 11 recites a satellite communication system. The communication system includes an antenna that receives a communication signal. An ADC converts the communication signal into a received signal. A satellite payload circuit having a first input, a second input, and an output, is coupled to the ADC via the first input. The satellite payload circuit digitally processes the received signal to form an interference reference feedback signal. A feedback signal path couples the output to the second input. The feedback signal path transfers the interference reference feedback signal from the output to the second input.

The Office Action states that the admitted prior art teaches a feedback signal path transferring an interference reference feedback signal from the output to the second input 18 and refers to the desired signal 34 and the interference reference signal 20. Applicants submit that the desired signal 34 is transferred from an output to a correlator and that the interference reference signal 20 is not a feedback signal

and is received by the correlator. The desired signal 34 and the interference reference signal 20 are not one in the same, but rather are separate signals. Also, the desired signal 34 is not transferred to the second input 18, but rather to the correlator. Additionally, the interference reference signal 20 is not transferred from the output to the second input 18, but is received by the second input 18 from the second source 22. This is clearly shown in Figure 1 and described in paragraph [0005] of the present application.

The Office Action states that the admitted prior art fails to teach: an ADC converting the communication signal to a received signal; a satellite payload circuit having a first input, a second input, and an output, the first input coupled to the ADC; and a satellite payload circuit digitally processing the received signal to form an interference reference feedback signal. Applicants agree. The Office Action however states that Cioffi provides such teaching. The Office Action states that Cioffi teaches digitally processing the received signal 108 to form an interference reference feedback signal v_{fD}. Again the referential use of "v_{fD}" with an interference reference feedback signal is improper. Applicants submit that the DSP 506 digitally processes the reference noise signal v_c and the desired signal v_{fD} to form the noise signal 512. The DSP 506 does not digitally process the received signal 108 and, as state, nowhere is an interference reference feedback signal used. Although Cioffi receives the reference noise signal v_c, the reference noise signal v_c is not a feedback signal.

Thus, the admitted prior art and Cioffi references, alone or in combination, also fail to teach or suggest each and every element as required of claim 11. As a result, Applicants submit that claim 11 is also novel, nonobvious, and is in a condition for allowance.

Claim 13 recites a communication system. The system includes an antenna receiving a communication signal. An ADC converts the communication signal into a received signal. A subtractor subtracts a counter-interference signal from the received signal to form a desired signal. A digital processor generates an interference reference feedback signal from the desired signal. A correlator compares the interference reference feedback signal to the desired signal to generate

an error signal. A controller adaptively cancels interference on the received signal based on the error signal.

The Office Action states that the admitted prior art fails to teach: an ADC coupled to an antenna, the ADC converting the communication signal into a received signal; a subtractor coupled to the ADC and subtracting a counter interference signal from a received signal to form a desired signal; and a digital processor coupled to a subtractor, the processor generating an interference reference feedback signal from a desired signal. Applicants agree. However, the Office Action states that Cioffi provides such teaching. The Office Action states that Cioffi teaches the removal of noise from received signals by adaptively estimating the radio frequency noise during data transmission when even no data has been transmitted. The Office Action further states that Cioffi teaches generating an interference reference feedback signal 512 from the desired signal 118. Applicants submit that Cioffi adaptively estimates radio frequency noise via the reference noise signal v_c not an interference reference feedback signal. Also, as stated above, the noise signal 512 is not a feedback signal nor is it an interference reference feedback signal. The noise signal 512 represents the noise to be removed or cancelled on the differential signal v_d.

Thus, the admitted prior art and Cioffi references, alone or in combination, also fail to teach or suggest each and every element as required of claim 13. As a result, Applicants submit that claim 13 is also novel, nonobvious, and is in a condition for allowance.

Applicants submit that since all of the objections and rejections are now overcome with respect to claims 1 and 11 and since claims 2-9 and 12 depend from claims 1 and 11, respectfully, claims 2-9 and 12 are also novel, nonobvious, and are in a condition for allowance.

In light of the amendments and remarks, Applicants submit that all objections and rejections are now overcome. The Applicants have added no new matter to the application by these amendments. The application is now in condition for allowance and expeditious notice thereof is earnestly solicited. Should the Examiner have any questions or comments, he is respectfully requested to call the undersigned attorney.

Respectfully submitted,

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